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ABSTRACT

The poor condition of many schools and other educational buildings is giving rise to increasing concern in many countries that are members of the Organisation for Economic Development and Cooperation. The disparity between concern with deterioration of educational buildings and the failure to fund improvements and/or maintenance is referred to as "the maintenance gap." The main article in this newsletter focuses on school maintenance. Although different levels of maintenance are often the responsibility of different tiers of management, they are interdependent. The article offers reasons for maintaining buildings, describes the scale and nature of the problem, outlines good practices in maintenance management (including 10 steps toward keeping schools in good condition), and highlights new approaches to funding. The 10 steps include the following: (1) Get an accurate estimate of the scale of funds needed; (2) prioritize expenditures; (3) assess the long-term costs of failure to maintain buildings properly in financial and educational terms; (4) procure the commitment of decision makers to the budget and priorities; (5) establish resource-allocation mechanisms that protect funds set aside for maintenance; (6) keep the condition of building stock under regular public review; (7) adhere to planned maintenance schedules; (8) promptly repair damage; (9) give maintenance responsibility to people closest to the building; and (10) involve staff and pupils in its management. (LMI)

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The PEB Property Management File

— *MAINTENANCE* —

WHAT DO WE MEAN BY MAINTENANCE?

To many people the word "maintenance" conjures up images of leaking roofs, pots of paint, ladders and inconvenience. The concept of maintenance is however a broad one: it can include major works of repair and rehabilitation, as well as redecorating and the day-to-day tasks of fixing washers and tightening screws. Approached correctly, maintenance encompasses many aspects of building management.

At its most fundamental level, maintenance can be seen as a manifestation of the degree to which educational buildings and the services provided within them are respected and valued by the users they serve and the society to which they belong.

The maintenance gap

The poor condition of many schools and other educational buildings is giving rise to increasing concern in many OECD Member countries. Substantial funds are devoted to maintenance, but there is a growing perception that educational buildings are not maintained to an acceptable standard.

Concern at the apparent deterioration of the educational building stock and the failure to make available sufficient funds to upgrade that stock in line with changing demands and expectations has led to what has become to be referred to as the maintenance gap.

A number of factors contribute to this situation:

- insufficient funds are made available for maintenance;
- the funds that are available are badly managed and poor value for money is obtained;
- the building estate is poorly managed and provision does not match educational need.

Attempts to quantify the size of the gap, between what is perceived to be needed and what is actually spent, have resulted in figures in the millions and billions, regardless of currency.

In 1991 the National Audit Office estimated that the cost of bringing school buildings in England up to an acceptable state of repair and to the accommodation standards defined in the School Premises Regulations was about £2 billion.

Such estimates highlight the level of concern shown by educators and the community at the condition of the building stock and of the inadequacy of funding. Few countries can contemplate the possibility of making available sufficient funds to close the gap quickly. As well as prioritising need within the total area of educational expenditure, it is also necessary to define priorities within the area of maintenance.

Keeping the fabric in good condition

It should be self-evident that every effort should be made to keep buildings — whether they are used for educational purposes or not — in good condition. The condition of buildings changes with use and time, and the providers and users of buildings are faced with a choice of actions to ensure that the building functions effectively. Their choice of action will be influenced by the standards that are expected and the resources that are available.

Buildings need to be maintained for a variety of reasons:

- ***to keep them clean and running efficiently;***
- ***to ensure that they provide a safe and healthy environment;***
- ***to ensure that they provide an environment that will continue to support their educational objectives;***
- ***to maintain their fabric;***
- ***to preserve their capital value.***

Maintenance can be considered at a number of interrelated levels:

- "day-to-day maintenance" of the building or keeping the building clean and operational through daily and intermittent action — cleaning, adjustment of heating and ventilation controls, replacement of light bulbs, internal and external painting, clearing of drains and gutters, repair of accidental breakage and damage;
- programmed maintenance of elements of the building according to their different servicing and life cycles, including the replacement of mechanical plant, the renewal of flat roofs, the replacement of worn floor finishes;
- periodic improvement to the building fabric which can include action to enable the building to meet new health and safety requirements, measures to improve energy efficiency and to meet increasing expectations for environmental quality, or other action designed to keep the building up to date;
- emergency and unforeseen action to repair damage, such as that from storms and floods, damage from vandalism, or damage associated with theft and arson;
- improvements to meet changing educational and social need such as provision for the application and use of computers and new information technology, provision of specialist spaces for science and technology, and provision for improved working and social areas for teaching staff.

These different aspects of maintenance, though often the responsibility of different tiers of management, are interdependent. The precise definitions of each may vary from country to country, but every system is faced with having to cope with all of these elements. Action in one area can have profound and sometimes costly implications for another. There is therefore a need for integrated planning and close co-operation and co-ordination between all those concerned with managing the building.

To take one example, a blocked gutter, something which in itself is simple and cheap to remedy, can lead if neglected to

A blocked gutter can lead to fungus attack.

long-term saturation of roof timbers and the establishment of fungus attack that can result in the need for extensive repair and perhaps replacement of the roof structure. In addition to the actual cost of the repairs, some account must also be taken of the unquantifiable cost of the disruption of teaching operations and the effect on students' progress.

Furthermore, the neglect of damage — whether caused by accident or vandalism — conveys an impression of lack of concern and respect for property and the working environment which can itself encourage further damage. The immediate and systematic repair of damage, although on the face of it an expensive course of action, encourages respect and reduces the likelihood of damage in the future.

Planned and emergency maintenance

Modern building science based on research and experience of buildings in use has enabled the useful life of many building components to be predicted. Appropriate cycles of regular care and replacement can then be determined. This allows long-term, planned maintenance strategies to be drawn up that include predictions of future need on which financial allocations can be based. However, as financial resources for educational building have come under increasing pressure in recent years, insufficient funds have been made available to cover these needs. The demands for funds to safeguard teaching posts and teaching resources, which have a more direct and identifiable impact on educational attainment, have understandably taken precedence over the need to maintain the stock of educational buildings. The funding of new initiatives is a more attractive option in political terms.

But some maintenance items cannot be ignored indefinitely. When a building becomes, or threatens to become, dangerous or unstable, action must be taken both to ensure the safety of the users and to conserve the building. The consequence is that the balance has been shifted away from action that is programmed, predicted and anticipated, to action that is unpredictable, unplanned and in many instances disruptive and expensive.

Major repairs and maintenance will always involve some degree of disturbance to a school. Building operations, if carried out during term time, may require some areas of accommodation to be taken out of use. There will be disruption from noise and dirt. There will be added risks to pupils' safety and to the security of the building and property. While it is difficult, it is possible with planned maintenance programmes to arrange for work to be carried out during the holidays or at the most convenient time of day. If necessary, temporary accommodation can be provided. Though some degree of disruption cannot be avoided it is clear that disturbance and irritation can be minimised if maintenance operations are planned, timed and carried out with the close involvement and co-operation of the school staff.

None of this can be assured when emergency repairs have to be carried out. An old, poorly maintained central heating system is likely to break down at a time of maximum demand, during the coldest spell of the year. As a result the building will probably be unusable, the pupils sent home and the teaching programme interrupted until repairs can be carried out. The building fabric will be at risk from frost damage. Contractors will be at their busiest, spare parts may not be available from stock, pressure of time may not allow for normal competitive tendering, work may have to be carried out at night or over the weekend. In the end, the repairs or replacement may take substantially longer, and cost substantially more, than if they had been anticipated and programmed.

Thus, while reductions in maintenance expenditure may lead to savings in the short term, there are likely to be longer-term economic and educational penalties associated with action that is driven by emergency need. It makes far more sense to replace building elements before they break down, or at the least to carry out regular inspections of those that are known to be reaching the end of their normal life. The Province of Quebec, Canada, carries out an annual survey of the condition of facilities in the school districts of the province. The results are published which enables each district to compare its situation with previous years, and with other districts.

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THE SCALE AND NATURE OF THE PROBLEM

The normal cost of maintenance

In an attempt to provide a simple principle to guide decision-makers in assessing the appropriate amount of resources to devote to maintenance, this "normal cost of maintenance" has sometimes been expressed as a percentage of the replacement value of the building stock. This definition of what might be regarded as a "normal" level of expenditure on maintenance, sufficient to keep the buildings in as-new condition, can vary between one and three per cent. Most estimates lie within the one and a half to two per cent range.

For financial planning purposes some average level of maintenance expenditure has to be assumed, but figures based on averages fail to take into account the wide variations in types of building, methods of construction, quality of materials and intensity of their utilisation, and, most importantly, the age of the buildings. It is important therefore that actual budgets for individual buildings or building components be based on detailed appraisals and knowledge of the building concerned.

It will clearly be easier to arrive at an estimate for a level of average expenditure where the management of a large mixed portfolio of buildings is being considered. Parallels can be drawn with the insurance industry where the peaks and troughs of accidental risks are evened out over the years. In the case of small estates or individual buildings, provision needs to be made for infrequent but expensive maintenance items and wide variation in levels of annual expenditure.

The consequences of poor maintenance

In very many countries, past failures to provide sufficient funds to maintain the stock of existing buildings over many years have led to an accumulated backlog of maintenance. The so-called "maintenance gap" has two principal elements: the amount required to provide for the continued maintenance of buildings which are already in acceptable condition, and the amount required to eliminate the backlog of maintenance to bring the buildings up to an acceptable condition. Where maintenance budgets fail to cover the first of these elements, the gap will increase; where they cover continued maintenance but not the backlog, the gap will remain. The aim of policy, once a realistic estimate of the maintenance gap has been made, should be to eradicate this gap as soon as is practical.

> ***The deferral of maintenance not only fails to ensure that a satisfactory quality of teaching environment is provided, but may also result in increased running costs and deterioration to other parts of the building.***

In a public school system, the uneven distribution of maintenance resources and the failure to maintain all buildings in an acceptable condition can raise the issue of equality of opportunity, particularly when the oldest and least well maintained buildings are associated with the poorest and most deprived communities. This issue has recently been considered by the courts in several states in the USA.

In his book *Savage Inequalities* Jonathan Kozol describes in detail the condition of buildings in a selection of school districts in the United States, and gives some disturbing insight into the way in which the underfunding of schools can affect the education of young people.

Maintenance and improvement

Given the political requirement to present spending proposals to the electorate, it is perhaps understandable that expenditure on a programme of improvements identified as necessary to meet new needs is given a higher priority than expenditure on day-to-day maintenance, whose effects are less dramatic. Much of the expenditure associated with maintenance does not result in any clear and measurable improvement in the quality of the environment or to levels of educational attainment. It may therefore be necessary, and desirable, to combine maintenance with improvement.

One example is that of measures that need to be taken to improve energy efficiency. In many countries a significant proportion of the existing school-building stock has flat roofs that are now 20 or more years old and due for replacement. These roofs are often badly insulated. Adding insulation at the same time as the roofs are replaced will result in a significant improvement in energy efficiency. In many cases the accumulated savings that will be made on fuel expenditure in future years can be shown to justify the cost of the additional insulation.

> ***Energy expenditure is an area that provides particularly good opportunities for savings and improvements. Energy expenditure in some Member countries can amount to as much as a third or more of premises-related expenditure.***

In addition, reducing energy consumption can help not only to save money, but also to reduce carbon dioxide emissions and other forms of pollution, and to conserve fossil fuels. *Building Bulletin 73* entitled "A Guide to Energy Efficient Refurbishment", and issued by the Department of Education and Science in London, gives several examples of successful measures undertaken. However, unless the funding and accounting mechanisms for repairs, improvement and the payment of fuel bills can be related to each other, the overall advantages will not be recognised and realised.

On an even larger scale similar arguments can be mounted to support the replacement and renewal of educational buildings on an individual and an area basis. Where detailed, long-term programmes of maintenance and repair have been prepared, and related to a thorough appraisal of immediate and long-term educational need, it has sometimes been possible to demonstrate that it is preferable on both economic and educational grounds to demolish an existing building and to replace it with a new one. The new building will probably be better suited to educational need, is likely to be cheaper to run, and the immediate anticipated maintenance need associated with the old building is avoided. But again, if such strategies are to have any hope of success, it is necessary to have in place administrative and financial mechanisms that recognise the interrelation of capital, maintenance and running budgets.

Maintenance and the age of buildings

Like other man-made objects, buildings have a finite economic life. Once a building has been completed, the length of that life is affected by three main factors: how it is looked-after, the way in which servicing and repairs are carried out, and the rate of obsolescence as needs and requirements change.

However, unlike many everyday pieces of machinery and equipment, whose useful life is often measured in years, the anticipated useful life of buildings and individual building components is measured in decades. The nature of much building construction enables separate components to be repaired and renewed on different time scales. Heating boilers and flat roofs may need to be replaced every twenty or thirty years, doors and windows may have a serviceable life of thirty or forty years or longer, while the basic structure of the building may be expected to last for 60 years or more and in some instances has remained in use for centuries.

The cycles of maintenance of individual building components can be aggregated to establish the maintenance needs of the building as a whole. When it is new, a high level of expenditure may be required in the first few months as initial commissioning faults are ironed out. The need for expenditure on maintenance will then settle down to a steady level of day-to-day maintenance. As the different components get older, expenditure again rises as the need for repair and replacement grows, until a point comes when further repair is no longer economically viable. This is the point at which the cost of replacement (taken over a period of ten, fifteen or twenty years) is less than the cost of continued maintenance. When this point is reached, a case can be made for replacement, either of a particular component or of the whole building. Only in the case of buildings of particular architectural or historical significance can continuing maintenance be justified beyond economic viability.

The extent of demand for maintenance expenditure is dependent to a large degree on the age of the stock, since deterioration is related to age. In many OECD Member countries the baby-boom years of the 1950s and 1960s coincided with moves to extend the period of compulsory schooling, and these two factors together led to a very significant expansion of the school-building stock. The demands were pressing, and the need to build quickly and at minimum cost resulted in a stock of buildings that have, in many instances, proved expensive to maintain. Many of these buildings are now entering their first cycle of major repair and renewal. As the growth in pupil numbers has diminished and the children of the baby-boom have moved through the system, the demand for new buildings has fallen. The profile of the stock of school buildings in most OECD Member countries is now heavily weighted towards buildings that are twenty-five to forty years old and the demands for maintenance expenditure can be expected to grow as these buildings age.

Maintenance and the extent of the building stock

The scale of the demand for maintenance expenditure is primarily determined by the extent of the stock of educational buildings, that is, the number of buildings and their area or volume.

Whilst changes in educational practice have created some new demands for space, the overall picture in many areas remains one of a surplus of accommodation, much of which is old and in need of repair and maintenance. This situation has led many authorities to carry out wide-ranging reappraisals of property needs.

Some buildings have remained in use for centuries...

Demographic changes may help to close the maintenance gap. Just as the schools of the 1960s and 1970s were built to house an unprecedented bulge in demand, so the stabilisation of birth rates and a reduced rate of population movement have reduced demand in many areas, sometimes by very significant amounts, resulting in a corresponding surplus of accommodation.

It can sometimes be argued that the possibility of a new increase in birth rates justifies keeping this surplus available to meet future demand for school places. However, it is unlikely that the increase will reach the previous peak, and the increase in demand may not be in those areas where the greatest surpluses of buildings exist.

Requests to keep surplus accommodation available for use should be rigorously scrutinised, since every square metre of accommodation has to be maintained, whether or not it is in use. It is not practical to manage the system so that there is an exact fit between the number of pupils and the number of places available in the

system, but efforts need to be made to keep the number of spare places to the minimum required to provide a margin of flexibility. It is clearly important to consider the continuing need for a building before committing scarce maintenance funds to it. Falling demand may allow the worst buildings to be removed from the system and the limited funds that are available for maintenance and improvement to be concentrated on the remainder.

Rising standards and expectations

While much of the demand for increased expenditure on maintenance is related to the deterioration of the existing buildings, a significant factor is the need to improve the stock to meet new health and safety standards and rising environmental expectations. Concern for the health and safety of both pupils and adults working in educational buildings, and the need to safeguard the natural environment has led to substantial unforeseen expenditure.

The association of certain forms of asbestos with the risk of lung disease has resulted in wide-ranging programmes of work being carried out to ensure the safe removal of asbestos-based material and its replacement with acceptable alternatives.

Concern is growing in most countries regarding some or all of the following: lead in drinking water and paint products; the use of PCBs; ozone-depleting gases in refrigeration plant; electromagnetic radiation from power transmission lines; Legionnaire's disease; formaldehyde released from building products; mercury contamination in older laboratories and naturally occurring radon gas.

There is a growing awareness of the risks associated with chemicals, dusts and solvents, leading to the need to install sophisticated plant and equipment for the removal of hazardous substances and the need to isolate certain activities.

Improved knowledge of the behaviour of people and materials in building fires has led to new requirements related to fire risks: for protected escape routes, for restrictions in the storage and use of combustible materials, for measures to limit the spread of smoke and fire and to protect the building structures from the effects of fire.

While new legislation or regulations related to any of the above are usually applied strictly to new buildings, these considerations can also affect existing buildings, particularly where major improvements or alterations are concerned.

The need for building maintenance is also affected by rising expectations about the quality of environment that educational buildings should provide.

It is no longer acceptable in many countries that educational buildings should be effectively closed to some members of the community. It is a frequent requirement, backed by legislation, to make the buildings accessible to the physically disabled. This requirement extends beyond the provision of ramped access to the main doors and suitable toilets: inside the building ramps or lifts will be needed between levels and floors; doors may have to be widened; additional space and special furniture and equipment may need to be provided in teaching areas; Braille signing and a variety of floor textures may be necessary to meet the needs of the blind; infra-red transmission and induction loops may need to be provided for sound reinforcement for those with impaired hearing.

Where electrical rewiring is necessary...

There has been a marked improvement in recent years in the quality of the working and living environment: in the standards of heating and lighting in the home and work place; in the quality of finishes and furniture. Many older educational buildings have failed to keep abreast of these developments. It will be hard to attract people into the teaching profession if they are obliged to work in substandard conditions, and the failure to provide acceptable conditions in the teaching environment will send a clear message to the young on the extent to which education is valued in society.

In many maintenance operations it is not considered sufficient to simply replicate what was there previously. As well as meeting current health and safety standards and using modern materials and technology, repair and renewal is expected to meet current expectations in regard to the quality of materials and environment.

Maintenance and changing educational need

The desire to improve the quality of the educational environment has been accompanied by strong pressures to modify the existing stock of educational buildings to meet the needs of new teaching and learning techniques and a rapidly changing curriculum. It is beyond the scope of this article to consider in detail the wider and more far-reaching issues that are raised by the maintenance implications of upgrading existing buildings to meet the demands of changing educational need. Again, as with the more technical aspects of maintenance, improvement is difficult to separate from repair and renewal.

Where electrical rewiring is required it will be necessary to consider the increased demand for power outlets for computers and other teaching equipment. At the same time consideration will need to be given to the networking of computer systems and

the provision of systems for telephone, TV, electronic mail, fax and other electronic media.

When refurbishing outdated science laboratories, account must be taken of developments in science education and reflect trends towards an increase in experimental work by students.

The 1994 survey by the US General Accounting Office found that requirements for science laboratories were not at all well met in 42 per cent of schools, and that 52 per cent of schools reported insufficient capacity in networks, modems, phone lines and cabling to enable them adequately to support technological education.

When replacing heating and ventilation services, consideration must be given to the new and more stringent health and safety requirements associated with dust and the use of hazardous substances in developing educational activities such as science, pottery and technology. Ventilation costs may be very substantial in vocational and professional education — for example where paint is being sprayed.

Where major remodelling or replacement is required there may be an opportunity to consider making the educational facilities more accessible to meet demands for wider use by the community out of school hours, or of using funds from non-education sources to expand social and recreational opportunities.

GOOD PRACTICE IN MAINTENANCE MANAGEMENT

Establishing the condition of the stock

If maintenance budgets are not to be dominated by unanticipated emergency items it is essential that a clear and systematic appraisal of the condition of the building stock be made and kept up to date. This is as true of an individual building as it is of a large estate of buildings of different types, and applies to new as well as to old buildings.

From the moment of completion, buildings enter into a progressive and cyclical process of ageing. Maintenance operations will be required throughout the life of the building. Knowledge of the age and condition of the building stock will enable maintenance needs to be predicted and planned to a considerable degree of precision. Bids for funds to finance maintenance will stand a better chance of acceptance if they are based on well-argued analysis which draws on accurate and up-to-date knowledge of the building stock.

Information will be needed on the type of construction of the buildings and on the age and condition of the different elements — the structure, the walls and roofs, the internal partitioning, the mechanical, heating and electrical services, wall and floor finishes, internal and external decorations, furniture and equipment, external roads, paths, drainage, planting and landscaping.

Planned maintenance

A well-prepared, long-term, costed maintenance plan will provide a good basis for establishing the case for funds to be made available for maintenance, and will ensure that the funds that are available are spent economically and to maximum effect.

Even though the funds available may be insufficient to meet all anticipated needs, the maintenance plan will enable informed decisions to be made when establishing priorities and will allow individual maintenance operations to be co-ordinated both with other actions within the field of repairs and maintenance, and with other aspects of property management.

Making the best use of resources

As well as allowing work to be carried out at minimum cost and with minimum disruption to the educational activities, well-planned maintenance programmes can help to get the best value and make the most effective use of whatever resources are available. Improvements to insulation to achieve better energy efficiency can be incorporated with roof renewal at little additional cost; provision for electronic communication can be made when electrical wiring is renewed; proper planning and co-ordination can ensure that road resurfacing takes place after rather than before the renewal of drain runs.

> *It is equally important to ensure that maintenance programmes are not pursued in isolation from the broader strategic planning process.*

There will be little point in undertaking major maintenance work at a school simply because it forms an item in a long-term programme, if at the same time in another part of the organisation decisions are being made to remodel or to extend the building to meet changing requirements, or to take the building out of educational use altogether.

Economic appraisal

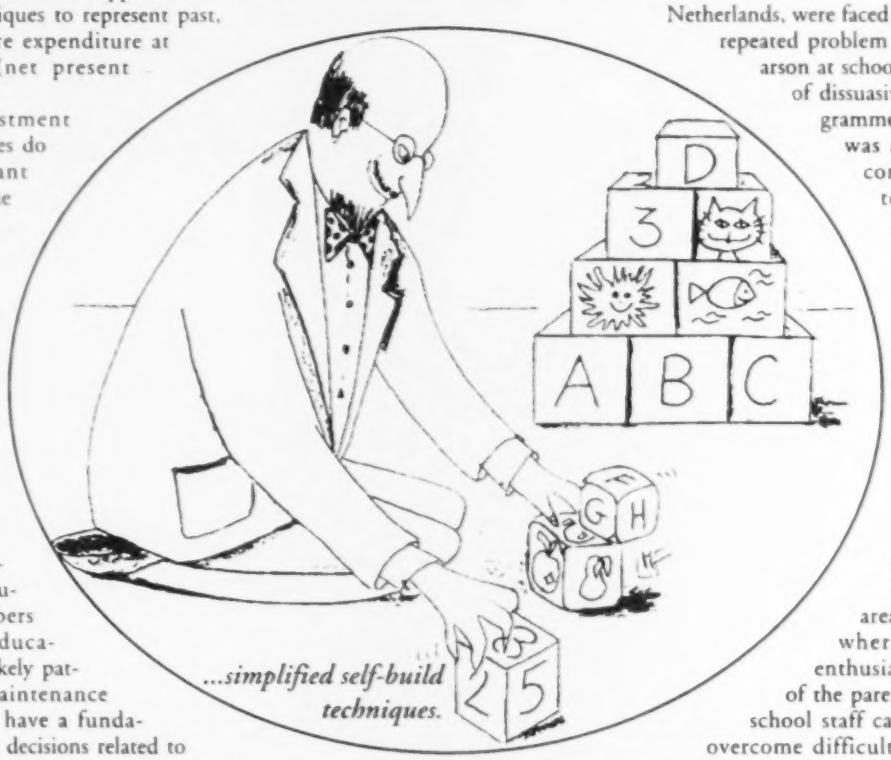
When resources for education are felt to be insufficient to meet all demands, maintenance expenditure is sometimes accorded a low priority against the need to maintain an adequate teaching staff or to provide teaching material and equipment. If expenditure on maintenance is to be justified, it needs to be argued in terms of the long-term implications on the premises-related costs associated with providing the education service. A variety of analytical tools are available to assess the economic benefits of alternative courses of action that can be of value in considering the allocation of scarce funds to maintenance needs.

The most direct application of such tools is in the case of maintenance and renewal that will result in a clearly quantifiable reduction in running costs, such as a floor finish that is quicker and cheaper to clean, or a new roof or replacement windows that will reduce fuel costs. In such cases it should be possible to demonstrate, through the use of simple pay-back analytical techniques, that the annual savings in running costs will recoup the capital costs in a short period.

Where a number of alternative solutions need to be considered — and these involve different levels of expenditure over a number of years — more sophisticated investment appraisal techniques can be used. These techniques relate the capital and recurrent expenditure over a given period of time and allow the alternatives courses of action to be compared on a common economic basis. For example, the option of maintaining an ageing

and inefficient heating boiler, with the consequent periodic replacement of worn parts and high fuel costs, could be compared with the alternative of installing a modern, efficient boiler with the promise of lower future servicing and fuel costs. An essential aspect of investment appraisal is the use of discounting techniques to represent past, present and future expenditure at current values (net present value).

While investment appraisal techniques do have an important application in some areas of maintenance budgeting, they can be even more useful in the broader field of strategic property management. When considering the long-term future of an existing building or an estate of educational buildings against fluctuating pupil numbers and changing educational need, the likely pattern of future maintenance expenditure may have a fundamental bearing on decisions related to which buildings should be maintained and improved, which ones should be demolished and replaced, and which buildings can be sold or released for other uses.



...simplified self-build techniques.

In this more general context, maintenance can be seen as an essential element in the formulation of a rational economic basis for decision-making. This is not to imply that far-reaching, educational planning decisions should be made simply on the basis of financial considerations. But the essentially political decisions, which are based on subjective factors such as the educational, social and environmental consequences of different courses of action, are better judged if the long-term and short-term economic consequences can first be identified and compared in an objective way.

Involving the school and the community

The condition of educational buildings is of direct concern to those who use them. The smooth running of the building, the knowledge that it is safe and provides a secure, comfortable and supportive environment can have an important bearing on the effectiveness of the education that is provided. A poorly maintained building may have a negative effect on the behaviour of the pupils and students, as well as the effectiveness of teaching.

Costs associated with vandalism and the damage caused by burglary and arson are a matter of increasing concern in some areas and account for a significant and rising proportion of maintenance and repair expenditure. While some of the cost is often covered by insurance, account must be taken of the unquantifiable educational and human cost of disruption to the teaching programme and the loss of pupils' work. Work in Member countries has shown that closely involving the pupils and the local community in taking measures to ensure that the buildings and property are respected can help to reduce the level of damage and loss.

The authorities in the City of Haarlem, the Netherlands, were faced with a growing and repeated problem of vandalism and arson at schools. After the failure of dissuasive measures a programme of improvements was agreed with local community leaders, teachers, parents and police. The expenditure involved was recouped within two years through lower rates of damage. (The programme is described in detail in *Schools for Cities*, published in 1995 by the OECD.)

There are some areas of maintenance where the energy, enthusiasm and resources of the parents, pupils and the school staff can be harnessed to overcome difficulties caused by the shortage of funds. Fund-raising activities, voluntary labour and recycled materials can be used to contribute to the improvement of school grounds, to extend educational and recreational opportunities and to improve the quality of the school environment. Fund-raising and the voluntary labour of parents and staff can be used to enable overdue redecoration to be carried out. With appropriate professional support, fund-raising and voluntary labour can be used to construct new educational or social facilities using simplified self-build techniques.

Tools of the trade

Recent developments in information technology have greatly assisted the establishment of up-to-date property records, the integration of different data bases covering different aspects of educational property management, and the matching of educational need to the provision of an appropriate quantity and range of accommodation.

Information about the extent and condition of the building stock, including cost estimates of outstanding maintenance work, can now be noted on site by inspectors using hand-held computers for later down-loading into central data bases. This information can be related to digitised plans of the buildings and records of past maintenance action. In some of the more sophisticated systems, data on the extent and nature of the accommodation can be cross-related to information on pupil numbers, curriculum and teacher availability to check on the suitability of the available accommodation to current and proposed educational needs.

It's taken me years to develop this routine.

A detailed survey of the structure and condition of a large number of buildings is a time-consuming and expensive task that can only be carried out by a suitably qualified and experienced building professional. However, an assessment of the general condition of the building, sufficient to identify the most significant items of outstanding maintenance, to categorise the severity of the problems and to form a broad indication of the cost of bringing the building up to an acceptable standard can be achieved at lower cost with less-experienced staff, provided appropriate training and supervision is given. Some authorities have developed simplified check lists on which the general condition of the different elements of the building are recorded using a graduated scale of marking. With co-ordination and comparative evaluation a reasonable consistency of marking can be obtained, allowing a number of individuals to quickly assess the separate buildings of an estate and allowing the records to be updated on a regular basis at acceptable cost.

Building-user manuals

Those who buy a new computer or a new car expect it to be accompanied by a comprehensive instruction manual. This will tell the new owner what it will do, how to operate it so as to obtain the best results, what to do when it goes wrong, where to go to have faults repaired or to buy accessories. It is rare to find such a document associated with a new building, though manuals are often provided with the more sophisticated elements of heating and ventilation equipment or security alarm systems.

There are many advantages to be gained from providing a "building-user manual". Such a document can provide advice on: the most efficient cleaning routines to be adopted; the operation of heating, lighting and ventilation plant to minimise fuel consumption and to obtain the best possible environmental conditions in different weather conditions; the need for regular inspection and routine replacement of, for example, fluorescent tubes and tap washers to minimise waste; the need for regular cleaning of drains and gutters; and on the anticipated operating life of the elements of the building.

Research

Many recent improvements in maintenance-management techniques and tools are the result of publicly financed research, or have been developed by or thanks to the work of specialised groups of building professionals, working for local authorities, and who have responsibility for large building estates. Recent initiatives in some Member countries to decentralise the management of buildings to smaller local organisations, or to the level of the individual school or college, may reduce the potential for further development of these tools unless continued funding for research can be assured.

Such work requires a substantial investment of time, manpower and computer facilities. Investment on this scale might be difficult to recover in a purely commercial environment, and it is doubtful if commercial organisations would be as willing to share their experience and expertise in national groups or international bodies such as PEB as the public sector has been. However, there are some indications that smaller organisational and administrative units are becoming aware of the benefits that can be gained by working together to meet common needs in such areas as the purchase of supplies and equipment. It may be that this principle will be extended in the future to embrace advice and expertise in the field of building maintenance.

Buildings of historic and architectural interest

Buildings are distinguished from other human artefacts in that they are expected to last far longer and they can embody important symbolic and cultural meaning. This is particularly true of educational buildings in societies that value education not only as a means of ensuring the wealth and prosperity of the nation but also as a means of transmitting cultural and social values. However, technical and social change has rendered obsolete

many buildings which were originally well-designed and which are still structurally sound.

Some older, well-loved and respected buildings, which have played an important part in the educational and social development of individuals and the society they serve, acquire a symbolic importance beyond their apparent functions. There is often a good case in these circumstances to pay the price of adapting and maintaining buildings to conserve part of the national architectural and cultural heritage, even where this involves expenditure which is greater than would have been incurred by the provision of a modern replacement building.

There are a number of examples in Member countries where such buildings have found a new lease of life as educational buildings. They include buildings as diverse as a redundant church, a castle, a warehouse and even a water reservoir, as well as older school buildings of historic or architectural significance.

While the conversion and remodelling costs may not be greater than those of more modern buildings, maintenance and running costs may well be far higher. Repairs and renewal may require a high level of skilled craftsmanship and the use of materials that are no longer commonly used in the building industry. The additional costs may be justified in the light of the significance of the buildings and the contribution they may be able to make in keeping traditional skills and trades alive.

Maintenance and employment

The maintenance of buildings tends by its nature to be labour intensive. One reason why maintenance costs have risen faster than costs of work on new buildings is the high labour content and the more limited scope for increasing productivity through the use of factory-produced products and mechanised processes on site. On the other hand, there is considerable scope for the use of unskilled and semi-skilled labour and for the work to be associated with training and work experience in the building industry. In a period of high unemployment there may be added social and educational value in directing expenditure towards building maintenance in order to create work, education and training opportunities.

New approaches to funding

Typically, those who are responsible for negotiating building-maintenance budgets have to be able to justify the allocation of resources, but they also have to be vigilant in seeing that the resources allocated are not subsequently withdrawn and put to other uses. There are a number of ways by which to ensure that a greater proportion of the resources set aside for maintenance are effectively locked in to their defined purpose. These include norm-based systems (which specify for example a certain amount of expenditure per square metre), the inclusion of responsibility for maintenance in initial construction contracts (which gives the builder an incentive to ensure that the building is properly maintained), or the transfer of responsibility for maintenance to agencies which will not have other conflicting calls on their resources, or to the school itself. Examples of each of these approaches were discussed in past issues of *PEB Exchange*, notably numbers 17, 18 and 19.

Ten steps towards keeping schools in good condition

- **Get as accurate an estimate as possible of the scale of funds needed for maintenance.**
- **Define priorities for expenditure.**
- **Assess the long-term costs of failing to maintain buildings properly in financial and educational terms.**
- **Ensure that these figures and priorities obtain the commitment of decision-makers.**
- **Establish resource allocation mechanisms that protect funds set aside for maintenance.**
- **Keep the condition of the building stock under regular public review.**
- **Stick to planned maintenance schedules. Once a deadline is missed it is difficult not to miss the next one.**
- **Act promptly to repair damage.**
- **Give responsibility for the condition of the building to people who are close to the building concerned. They are better able to spot problems and more likely to have a direct interest in their resolution.**
- **Involve the users of the building — staff and pupils — in its management.**

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